2.11 Paleontology

2.11.1 Regulatory Setting

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1935 [20 USC 78], and the Omnibus Public Land Management Act of 2009 [16 USC 470aaa]). Under California law, paleontological resources are protected by the California Environmental Quality Act, the California Code of Regulations, Title 14, Division 3, Chapter 1, Sections 4307 and 4309, and Public Resources Code Section 5097.5.

2.11.2 Affected Environment

This section is based on the *Paleontological Identification and Evaluation Report* (October 2010).

A paleontological literature review was conducted using unpublished reports, paleontological assessment and monitoring reports, field notes, published literature, and maps. A paleontological resource records search was not conducted for this project for two reasons: (1) there is no current repository for fossil localities from projects conducted in the County since 1977; and, (2) suitable information existed in reports of paleontological mitigation from surrounding residential and commercial development to prove the sensitivity and significance of any fossils that might be encountered within the study area (refer to Figure 1-1 for the study area). In addition, pedestrian surveys of the study area were conducted on various dates in December 2009 to identify whether any paleontological resources might be exposed on the surface.

The study area is within the northern end of the Peninsular Range Province of Southern California. Specifically, the proposed project is located along the San Juan Creek drainage and south along the southern San Joaquin Hills. The San Joaquin Hills are a coastal extension of the Santa Ana Mountains and the westernmost range of the Peninsular Ranges Geomorphic Province. Exposed formations have a combined thickness of 22,000 feet (ft) and range in age from the Paleocene to the Late Pleistocene. The hills consist of both marine and terrestrial sediments and intrusive igneous rocks.

Geologic mapping indicates that sediments from the Siltstone Member of the Capistrano Formation, large-scale Quaternary Landslide deposits, Quaternary Marine and Non-Marine Terraces, Quaternary Younger Alluvium, and Quaternary Wash deposits occur within or immediately adjacent to the study area. The specific sensitivities for formations and units within the study area are listed in Table 2.11-1 and lists the sensitivities determined by Eisentraut and Cooper (2002) and the corresponding Paleontological Potential Scale used by the Department. As shown, the Marine Terrace deposits and the Capistrano Formation are high or very high based on paleontologically significant fossil remains that have been recovered from these units in other areas.

Table 2.11-1 Paleontological Sensitivity of the Geologic Units in the Study Area

Geologic Unit	Paleontological Sensitivity (Eisentraut and Cooper, 2002)	Paleontological Potential (the Department)
Artificial Fill	Not Rated	Low
Young Alluvium	None	Low
Wash Deposits	None	Low
Landslide Deposits	Not Rated[1]	Low
Older Alluvium	High	High
Marine Terrace Deposits	High	High
Capistrano Formation	Very High	High

Source: Paleontological Identification and Evaluation Report (June 2010).
[1] In the northern portion of the study area there is a buried, very large landslide that has a high paleontological sensitivity.

The pedestrian survey confirmed much of the geology as it has been mapped. In localized areas, artificial fill has been added and some limited exposures of subsurface bedrock are located along the portion of the study area near the future Marblehead development and Stonehill Drive.

2.11.3 Environmental Consequences

2.11.3.1 Temporary Impacts

Alternative 4 with Design Option A (Preferred Alternative)

Build Alternative 4 with Design Option A would require ground disturbance and modification to existing freeway and local street structures. These construction activities could result in direct or indirect impacts to paleontological resources. The potential impacts to paleontological resources would be permanent direct or indirect

impacts and are addressed below. Therefore, any analysis of direct or indirect temporary impacts is not applicable.

2.11.3.2 Permanent Impacts

Alternative 4 with Design Option A (Preferred Alternative)

As discussed above, sediments in the study area have the potential to contain significant, unrenewable paleontological resources, and it is likely that paleontological localities will be encountered during project excavation. To reduce direct or indirect impacts to any paleontological resources that may be present within the study area, where excavation may take place in areas of undisturbed soils, a Paleontological Mitigation Program (PMP), as specified below in Mitigation Measure PAL-1, would be implemented during construction.

2.11.4 Avoidance, Minimization, and/or Mitigation Measures

The following measure starts with avoidance of the resource area by the proposed project and continues with recommendations for impact mitigation measures during construction excavation.

PAL-1 Prior to construction activities, the California Department of Transportation (Department) shall ensure that a Paleontological Mitigation Plan (PMP) is prepared and adhered to during construction of the project portions that are identified as having high paleontological sensitivity. The PMP shall include, but not be limited to, the following:

- A preconstruction field survey should be conducted in areas identified as having a high paleontological sensitivity after vegetation and any paving is removed, followed by salvaging of any observed surface paleontological resources prior to the beginning of additional ground-disturbing activities.
- Attendance at the pregrade meeting by a qualified paleontologist. At this meeting, the paleontologist will explain the likelihood for encountering paleontological resources, what resources may be discovered, and the methods that will be employed if anything is discovered (see below).
- During construction excavation, a qualified paleontologic monitor shall initially be present on a full-time basis whenever excavation will occur within the sediments that have a high paleontological

sensitivity rating and on a spot-check basis for sediments that have a low sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating (monitoring reductions and when they occur will be determined by the qualified Principal Paleontologist). The monitor shall inspect fresh cuts and/or spoils piles to recover paleontological resources. The monitor shall be empowered to temporarily divert construction equipment away from the immediate area of the discovery. The monitor shall be equipped to rapidly stabilize and remove fossils to avoid prolonged delays to construction schedules. If large mammal fossils or large concentrations of fossils are encountered, the agency shall consider using heavy equipment on site to assist in the removal and collection of large materials.

- Localized concentrations of small (or micro-) vertebrates may be found in all native sediments. Therefore, it is recommended that these native sediments occasionally be spot-screened on site through one-eighth to one-twentieth-inch mesh screens to determine whether microfossils are present. If microfossils are encountered, sediment samples (up to 3 cubic yards, or 6,000 pounds) shall be collected and processed through one-twentieth-inch mesh screens to recover additional fossils.
- Any recovered specimens shall be prepared to the point of identification and permanent preservation. This includes the sorting of any washed mass samples to recover small invertebrate and vertebrate fossils, the removal of surplus sediment from around larger specimens to reduce the volume of storage for the repository and storage cost, and the addition of approved chemical hardeners/stabilizers to fragile specimens.
- Specimens shall be identified to the lowest taxonomic level possible and curated into an institutional repository with retrievable storage. The repository institutions usually charge a one-time fee based on volume, so removing surplus sediment is important. The repository institution may be a local museum or university that has a curator who can retrieve the specimens on request. The Department requires that a draft curation agreement

be in place with an approved curation facility prior to the initiation of any paleontological monitoring or mitigation activities.

- Preparation and submittal of the Paleontological Mitigation Report (PMR) documenting completion of the PMP for the Lead Agency (the Department).

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